

The Moderating Effect of Human Capacities in the Relationship between Personality Traits and Creativity of Architecture Students

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Abstract:

A large and diverse number of studies on the relationship between creativity and personality have been conducted, but little or no study known has investigated the moderating influence of capacity in the relationship between personality traits and students' level of creativity, a gap which this study seeks to bridge. This study investigates how human capacity moderates the relationship between students' creativity and their personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). The participants in this survey constituted a total of 320 that cut across Architecture students, Interior Design and Fine Arts students from the biggest five universities in Northern Cyprus. The questionnaire was developed for data collection. Data assembled was analyzed using mean and standard deviations, as well as percentages. Other analyses included correlation and regression analysis. Our findings illustrate that four dimensions of personality traits, except for Neuroticism, affect the individual level of creativity in varying degrees. Our findings also concluded that human capacity variables such as resources, skills, environmental conditions, intrinsic motivation and knowledge moderates the relationship between personality and students' level of creativity.

Keywords: Creativity; Personality Traits; Individual Capacities; Architecture Students; Education.

1. Introduction

Creativity, as a concept, is common to several disciplines including the arts, sciences, law, and engineering, among others and thus it is better studied contextually. De Lucia et al., (2016) stated

that creativity can be seen as a seed of innovation. In particular, Danaci (2015) acknowledged creativity in architecture as the “cornerstone” of architecture. Today, the focus on creativity in the educational area has increased. The reason for this includes the need to enhance the future success of individual students as contributors in a knowledge-based economy and their accomplishments (Castillo-Vergara et al., 2018; Mullet, 2016).

Creativity is one of the basic skills to learn how to deal with the increasing complexity of everyday issues in the 21st century (Collard & Looney, 2014). It is described as the “cognitive ability to generate new ideas, concepts, designs and opportunities”; while innovation “helps to add values to a new style of thinking (Mishra et al., 2016). However, this study is not so much interested in determining whether or not creativity is innate or learned, but focuses on studying whether or not students’ personalities and capacities influence the level of their creativity among architecture students in Northern Cyprus. Several studies right from the time of Guilford (1950) to more recent studies such as Puryear et al. (2019) who found connections between personality and creativity. Wang et al. (2017) revealed that students of different personality types tend to perform creative tasks in different creative styles. Bridges and Schendan (2019) stated that identifying the creative character was difficult. However, these studies did not include capacities as one of the variables, a gap which the study seeks to bridge.

Today, education, especially, architectural education is an un-revealed collaboration of technique and aesthetics (Irouke & Ahianba, 2013). The field of architecture is endowed with techniques, grammar, designs, which depicts creativity thus making the selection of architecture students in Northern Cyprus a suitable area/context for this study. In the context of this study therefore, creativity is defined as the ability of “seeing things” just like everyone else, but making connections that no one else made”. In other words, we become creative when we move from what is already known to that which is unknown. This definition shows that everyone is creative to some extent. It is an attribute that impacts decision -making, personal development and problem-solving abilities (Chan & Yuen, 2014). These abilities are of great demand in the 21st century to meet the requirements for technological advances, political changes, economic development, and social welfare issues, among others (Mishra & Henriksen, 2018).

Another key concept in this study that is worth dissecting is personality. A personality is a group of patterns of thought, feelings, and behavior that result from one situation to another (Michalos, 2014). Personality is defined as a dynamic, developing system, capable of change (Kreitler, 2019). These researches were conducted out of curiosity to understand and expect individual reactions towards various situations (Boyce et al., 2019). It explains relatively stable ways of thinking, feeling, and acting when interacting with the physical and social environment (McCord et al., 2019). It is attachment experiences that have been recognized in playing a primary role in personality performance and psychopathology growth across the lifespan (Rosa-Mendes, 2019). Personality is likened to behavior, attitudes or individual characteristics. This study, in the attempt to discuss the relationship between personality and students’ creativity, adopted the five big personality models, which according to Hazrati-Viari et al. (2012), is the most acceptable model in the fields of psychological and behavioral research. Thus, the model was proposed by Costa and McCrae (1992) as a strong framework to interpret different types of personalities connected to academic behaviors (Poropat, 2009). The main variables of the big five

model are neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness.

Neuroticism is a variable that accounts for individual tendencies over emotional stability such as jealousy, anxiety, fear, or insecurity. Extraversion measures individual social level, that is, how one relates to others. Openness to experience accounts for one's level of fantasy or imagination as well as one's intellectual curiosity, among others. Agreeableness indicates how one relates to others in terms of friendliness, tactfulness, helpfulness or cooperativeness. Conscientiousness accounts for one's zeal for achievement, one's carefulness or organized nature (Raza & Shah, 2017).

This leads us to the third key concept in this study; human capacities. Capacity is likened to the power or ability to do something (Bebbington et al., 2006). In other words, capacities describe ones' ability, competence, and efficiency in dealing with situations or problems. When considered systemically, capacity, according to Morgan (2006), is seen as attributes that allow a man to create value needed for development. Zinke (2006) defines it as the overall ability of a system to perform and to sustain itself. This definition indicates that capacity is multifaceted in nature. It is the ability to solve a problem; in this case, one becomes creative, using knowledge, skills, or other resources at one's disposal. Krishnaveni and Sujatha (2013) link capacities with potentials. In this sense, when one has the potentials to use available resources effectively and efficiently to get things done, then, such a one could be said to have the capacity. Capacity is not passive but active, it is dynamic and sustainable. This study is looking at how human capacity and personality enhance the level of creativity in architectural students.

Several studies on the relationship between personality and creativity from the earliest studies such as Guilford (1950), Barron and Harrington (1981) to some more recent studies such as Puryear et al. (2019) indicated that there is a relationship between personality and creativity. But little or no study known has investigated the moderating influence of capacity in the relationship between personality traits and students' level of creativity, a gap which this study seeks to bridge.

2. Theory and hypotheses

2.1. Purpose of the study

To date, the results from the relationship between the big five personality traits and creativity are not yet conclusive, thus causing more confusion and arousing the interest of new researchers to investigate the relationship in a different context. As a result, the present study also seeks to investigate the interaction between personality, capacities, and creativity among architecture students. Given that lots of studies have already been carried out to ascertain the relationship between personality and creativity, this study goes a little further to determine the moderating effect of human capacity in the relationship between personality and creativity.

2.2. Hypotheses

The following hypotheses thus constitute the premise for this study:

H1a: Neuroticism has a positive and significant effect on students' level of creativity.

- H1b: Extraversion has a positive and significant effect on students' level of creativity.
H1c: Openness to experience has a positive and significant effect on students' level of creativity.
H1d: Agreeableness has a positive and significant effect on students' level of creativity.
H1e: Conscientiousness has a positive and significant effect on students' level of creativity.
H2: Resources will moderate the relationship between neuroticism and students' level of creativity.
H3: Skills will moderate the relationship between openness to experience and students' level of creativity.
H4: Environment will moderate the relationship between extraversion and students' level of creativity.
H5: Intrinsic motivation will moderate the relationship between agreeableness and students' level of creativity.
H6: Knowledge will moderate the relationship between conscientiousness and students' level of creativity.

2.3. Conceptual Model of the study

Based on the hypotheses stated above, the conceptual model for this study is shown in Fig.1:

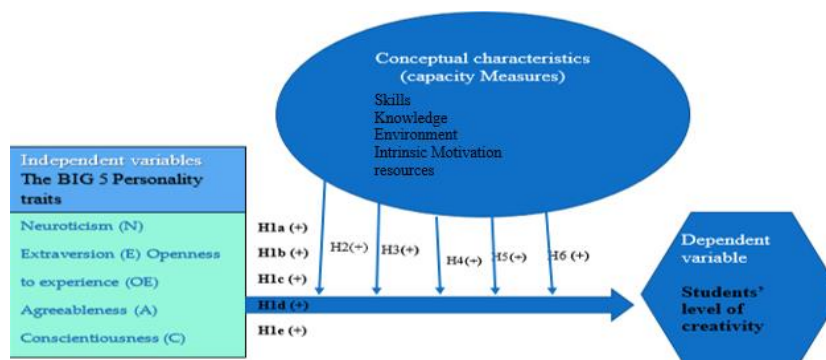


Fig.1. The research model used in this study; (Source: Researchers' conceptualization)

3. Research methodology

3.1. Target population and sampling procedure

The study participants in this survey constituted a total of 320 Architecture Students, Interior Design and Fine Arts students from Cyprus International University (CIU), Near East University (NEU), Eastern Mediterranean University (EMU) and Girne American University (GAU) in Northern Cyprus. The composition of the sample included 57.8% male and 42.2% females. Students from all levels participated in the study. Accordingly, 52.5% were from the first and the second year; 40.9% were from third and fourth, 5.9% were from master students and 0.6% Ph.D. Data was distributed to these participants in person in their various schools by the researchers and retrieved same day.

3.2. The measurement instrument

The study specifically aimed at gathering evidence to determine the causal relationship between the Big Five personality traits and Architectural students' level of creativity and the moderating effects of students' capacities variables and the Big Five personality traits and students' level of creativity. The questionnaire was developed for data collection.

For this study, one questionnaire was adopted in data collection. The questionnaire was based on a previous standardized instrument designed to assess personality, capacity and creativity variables according to the works of (Smith, 2010; John et al., 2011; Gross & John, 2003; ROSELLO & TRAN, 2011; Thomas, 2011; Rahimi et al., 2011) respectively. Consequently, the items in the questionnaire used the prescribed wording, definition as well as prescribed response format as proposed by their original authors; however, there were slight modifications to suit the present study. To avoid being too lengthy, the researchers only selected some of the items from the original sources, modified slightly and compiled to form the primary instrument for this study. Apart from the first section that was meant to elicit responses on the respondents' demographic data such as gender, school, department, nationality and year of study, the other sections of the questionnaire adopted the five-point Likert scale of "strongly disagree=1", "disagree=2", "neutral=3", "agree=4" and "strongly agree=5" in its rating.

The first section of the questionnaire assessed creativity variables. Each of the four constructs of creativity (Generating Ideas, digging deeper into Ideas, Exploring Ideas, and Listening to your Inner Voice) was accompanied by 7 items, thus a total of 28 items assessed creativity. The third section of the questionnaire assessed personality traits and constituted 44 items to represent the Big Five personality traits. The last section of the questionnaire assessed human capacity. It comprises seven constructs, each accompanied by between 5 to 8 items thus resulting in a total of 41 items. This implies that the questionnaire adopted in this study constitutes a total of 113 items.

Although the questionnaire had already been validated by their original developers, for the purpose of this study, the researchers again first subjected the questionnaire to pre-testing using twenty lecturers from Arts, Architecture, and engineering departments. The answered

questionnaire from the pilot study was subjected to statistical analysis to test the extent to which the items developed in the questionnaire measure each construct using principal components analysis. In this case, the factor loadings scale range between -1.0 and 1.0. The higher and the closer to 1 is better. More so, the items in the questionnaire were also tested using Cronbach alpha. According to Johnson (2009), Golafshani (2003) and Field (2009), respectively, the acceptable value is 0.70 and above, below which the item is considered unreliable. Table 1 below summarized the result from the reliability test carried out on the instrument.

Table 1
Summary of the KMO Statistics and Cronbach Alpha of Human capacity questionnaire

Category	Constructs	No of items	Cronbach Alpha	KMO Statistic
Creativity (28)	Generating Ideas	7	0.85	0.71
	Digging deeper into Ideas	7	0.83	0.69
	Exploring Ideas	7	0.79	0.80
	Listening to your Inner Voice	7	0.81	0.73
Big Five Personality (44)	Extraversion	9	0.79	0.70
	Openness to experience	9	0.83	0.70
	Conscientiousness	9	0.77	0.81
	Neuroticism	9	0.88	0.79
	Agreeableness	8	0.82	0.78
Human capacity measure (41)	Skills	7	0.79	0.83
	Resources	4	0.85	0.82
	Environment	8	0.83	0.87
	Intrinsic Motivation	8	0.87	0.82
	Knowledge	4	0.85	0.77
	Total	103		

The reliability results of all constructs range from 0.79 to 0.87 as shown in Table 1. They are all upward of threshold of 0.70, thereby showing the internal consistency of the research constructs.

4. Data analysis and results

4.1. Correlation

This accounts for the composite means, the standard deviations as well as the correlation of all the variables that constitute the constructs used in this study as well as its validity. Table 2 below presents the reports from the means, standard deviations and inter-correlations of all study variables among which are: the control variables (gender and school), dependent variable (creativity), independent variables (Big Five personality traits), and moderators (capacity measures). The means score of all the constructs adopted in this study were computed to account for the variable that averaged the highest. The standard deviations of the variables were also measured to indicate the spread of the data or the closeness of the data to the central or various means; whereas correlation analysis was carried out to determine the strength and direction of the relationship between the variables. The summary of the outcome from the analysis is presented in Table 2 below.

As revealed in the Table, all the predictor variables (Extraversion, Openness to Experience, Conscientiousness, Neuroticism, and agreeableness) had 320 responses. As shown in Table 2, the composite means of all the variables range between 3.46 to 4.01 which implies that all the variables had high composite mean value. This indicates that the majority of the respondents agreed to the statements in the questionnaire.

As presented in Table 2 below openness to experience has a significant positive relationship with creativity ($r = 0.107$, $p = 0.05$). The relationship between extraversion and creativity is also positive ($r = 0.131$, $P = 0.01$). This shows that any increase in openness to experience and extraversion will lead to the corresponding increase in students' level of creativity, according to the result of this study.

However, neuroticism showed a negative but significant relationship with creativity ($r = -0.11$, $p = .05$). This implies that an increase in neuroticism will lead to a decrease in students' level of creativity. On the other hand, the relationship between Conscientiousness and creativity was not significant, likewise agreeableness. This implies that an increase in conscientiousness and agreeableness will not have any impact on students' level of creativity, according to the outcome of this study.

Table 2. Showing the means, standard deviations, and intercorrelations of creativity, big five personality traits and capacity variables, including control variable (gender and school)

Constructs		M	S	1	2	3	4	5	6	7	8	9	10	11	12	13
		D														
1	Gender	3.46	.74	1												
2	School	3.68	.63	0.057	1											
3	Creativity	3.47	.58	0.122	.307**	1										
4	Openness to experience	3.47	.84	0.118	0.012	0.107*	1									
5	Extraversion	3.51	.71	0.021	0.038	0.131*	0.095	1								
6	Neuroticism	3.53	.67	0.082	0.107	-0.101*	.367**	0.003	1							
7	Conscientiousness	3.62	.73	0.101	-0.003	0.194	.325**	0.108	-0.002	1						
8	Agreeableness	3.95	.78	0.016	0.178*	0.163	.386**	0.068	.471**	.221**	1					
9	Skills	3.90	.70	0.055	-0.112	0.187*	.212**	.238**	.128*	-0.008	0.114	1				
10	Resources	4.01	.71	0.116	0.142*	0.102*	.227**	.259**	.228**	0.013	0.111	.613**	1			
11	Work environment	3.96	.72	0.095	0.011	0.405*	.309**	.199**	.226**	0.096	0.188*	.663**	.662**	1		
12	Intrinsic motivation	3.81	.60	0.068	0.034	0.302*	0.055*	.138*	0.014	0.071	0.069	.243**	.191**	.242**	1	

					*												
1	Knowledge	3.	.6	0.1	0.1	0.1	0.2	.24	.27	-	0.0	.13	-	0.1	0.1	1	
3		46	3	33*	22	80*	54*	2**	9**	0.1	31	8*	0.0	61*	39*		
						*	*			2			63	*			

N=320; *p < .05, **p < .01, ***p < .001

4.2. Regression Analysis

The researchers tested the hypotheses formulated using hierarchical regression analysis. The choice of hierarchical regression analysis for this study was based on the fact that several independent variables are involved. Hierarchical regression, as a statistical method, basically explores the relationships among, as well as testing the hypotheses about the dependent variable and several independent variables. In this study, each of the dimensions of the Big Five personality traits was tested separately and the result is as presented on the tables below.

For the purpose of this study, gender and school were used as the control variables and were entered in the first column labeled step 1. The second column constitutes the variables of the independent variables, that is, the predictors. The column is labeled step 2, while the column labeled “step 3” is where the interaction effects were entered to account for the moderating effect of the selected variables of capacity in the relationship between the Big five personality traits and level of students’ creativity. Step 1 shows that the control variables have negative values, and there is no evidence on the level of creativity. This implies that individual creativity is not impacted by gender or school, according to the outcome of this study.

As shown in Table 3 below, step 2, The relationship between neuroticism and student’s level of creativity is not significant, but also negative ($\beta = -0.173$). Thus, hypothesis one was not supported (H1a) indicating the neuroticism does not significantly impact student’s level of creativity.

In step 3, the study revealed the interaction effect between Neuroticism and capacity ($\beta = 0.167$; $p < 0.05$) has a statistically significant influence on creativity. This implies that, although our study indicated that neuroticism does not have a significant impact on students’ level of creativity, however, when capacity is applied, the relationship becomes significant and positive. By implication, capacity could be said to have a moderating effect on the relationship between personality and creativity. As indicated in the same table, other variables of capacity that have moderating effects in the relationship between neuroticism and creativity include resources ($\beta = 0.098$, $P < 0.01$), intrinsic motivation ($\beta = 0.219$, $p < 0.001$), and knowledge ($\beta = 0.042$, $P < 0.05$). Based on this premise, we reject H1a but accept H2.

Table 3. Hierarchical Regression Analysis: Neuroticism and students’ level of creativity

	Step 1	Step 2	Step 3
Gender	-0.112	-0.202	-0.193

School	-0.018	-0.010	-0.012
Neuroticism		-0.173	-0.158
Moderator Resources		0.094	0.098**
Moderator Skills		0.036	0.014
Moderator work environment		0.079	0.043
Moderator intrinsic motivation		0.194***	0.219***
Moderator knowledge		0.063	0.042*
Neuroticism*capacity			0.167*
R	0.213	0.357*	0.414*
R Square	0.053	0.144*	0.172*
R Square change	0.053	0.082*	0.037*

Table presents standardized Beta coefficients; Note: *p < 0.05; ** p < 0.01; *** p < 0.001; n = 320

As indicated in Table 4 below, the control variables all have negative values and indicated no significance. In Step 2 Column, the study revealed that extraversion has a significant positive relationship with the student's level of creativity ($\beta = 0.194$, $p < 0.001$). Thus, hypothesis H1b was supported indicating that extraversion is positively related to the student's level of creativity. In step 3, the study revealed that the interaction effect between extraversion and capacity ($\beta = 0.174$; $p < 0.01$) has a statistically significant influence on creativity, but this is only true with capacity variables such as work environment ($\beta = 0.221$, $P < 0.05$); intrinsic motivation ($\beta = 0.212$, $p < 0.01$), and knowledge ($\beta = 0.042$, $P < 0.05$). Based on this premise, we accept H4.

Table 4. Hierarchical Regression Analysis: Extraversion and students' level of creativity

	Step 1	Step 2	Step 3
Gender	-0.112	-0.109	-0.111
School	-0.018	-0.018	-0.019
Extraversion		0.194***	0.196***
Moderator Resources		0.084	0.50
Moderator Skills		0.063	0.019
Moderator work environment		0.036	0.221*
Moderator intrinsic motivation		0.190*	0.212**
Moderator knowledge		0.063	0.042*
Extraversion *capacity			0.174**

R	0.233	0.387*	0.430
R Square	0.053	0.148**	0.184
R Square change	0.053	0.095**	0.036

Table presents standardized Beta coefficients; Note: *p < 0.05; ** p < 0.01; *** p < 0.001; n = 320

In Table 5 below, openness to experience has a positive significant relationship with student's level of creativity ($\beta = 0.061$, $p < 0.001$). Thus, hypothesis H1c was supported showing that openness to experience is positively related to a student's level of creativity. In step 3, the study revealed that the interaction effect between openness to experience and capacity ($\beta = 0.841$; $p < 0.001$) has a statistically significant influence on creativity, with respect to skills ($\beta = 0.019$; $P < 0.01$), intrinsic motivation ($\beta = 0.231$, $p < 0.01$), and knowledge ($\beta = 0.671$, $P < 0.01$), thus we accept H3.

Table 5. Hierarchical Regression Analysis: openness to experience and students' level of creativity

	Step 1	Step 2	Step 3
Gender	-0.112	-0.119	-0.117
School	-0.018	-0.016	-0.016
openness to experience		0.061***	0.063***
Moderator Resources		0.084	0.50
Moderator Skills		0.063**	0.019**
Moderator work environment		0.308	0.310
Moderator intrinsic motivation		0.190*	0.231**
Moderator knowledge		0.0670**	0.671**
Openness to experience *capacity			0.841***
R	0.233	0.291	0.315
R Square	0.053	0.083	0.098
R Square change	0.053	0.030	0.015

Table presents standardized Beta coefficients; Note: *p < 0.05; ** p < 0.01; *** p < 0.001; n = 320

In Table 6 below, agreeableness has a positive significant relationship with student's level of creativity ($\beta = 0.063$, $p < 0.01$). Thus, hypothesis H1d was supported indicating that agreeableness is positively related to the student's level of creativity, according to this study. In step 3, the study revealed that the interaction effect between agreeableness and capacity ($\beta = 0.241$; $p < 0.001$)

has a statistically significant influence on creativity, with respect to Knowledge ($\beta = 0.67$; $P < 0.01$), and intrinsic motivation ($\beta = 0.166$, $p < 0.01$). We also accept H5.

Table 6. Hierarchical Regression Analysis: agreeableness and students' level of creativity

	Step 1	Step 2	Step 3
Gender	-0.112	-0.107	-0.096
School	-0.018	-0.016	-0.016
Agreeableness		0.063**	0.066**
Moderator Resources		0.102	0.158
Moderator Skills		0.071	0.062
Moderator work environment		0.311	0.315
Moderator intrinsic motivation		0.162*	0.166**
Moderator knowledge		0.062**	0.67**
Agreeableness *capacity			0.241***
R	0.233	0.284	0.359
R Square	0.053	0.081	0.128
R Square change	0.053	0.026	0.047

Table presents standardized Beta coefficients; Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $n = 320$

In Table 7 below, conscientiousness has a positive significant relationship with student's level of creativity ($\beta = 0.083$, $p < 0.01$). Thus, hypothesis H1e was supported indicating that conscientiousness is positively related to the student's level of creativity. In step 3, the study revealed that the interaction effect between conscientiousness and capacity ($\beta = 0.132$; $p < 0.001$) has a statistically significant influence on creativity, with respect to Knowledge ($\beta = 0.082$; $P = 0.01$), intrinsic motivation ($\beta = 0.166$, $p < 0.01$), skills ($\beta = 0.070$; $p < 0.05$) and resources ($\beta = 0.035$, $p < 0.01$). We also accept H6.

Table 7. Hierarchical Regression Analysis: conscientiousness and students' level of creativity

	Step 1	Step 2	Step 3
Gender	-0.112	-0.107	-0.096
School	-0.018	-0.016	-0.016
conscientiousness		0.083**	0.086**
Moderator Resources		0.033	0.035**

Moderator Skills		0.068	0.070*
Moderator work environment		0.301	0.305
Moderator intrinsic motivation		0.162*	0.166**
Moderator knowledge		0.080**	0.082**
conscientiousness *capacity			0.132***
R	0.233	0.279	0.339
R Square	0.053	0.090	0.138
R Square change	0.053	0.016	0.042

Table presents standardized Beta coefficients; Note: *p < 0.05; ** p < 0.01; *** p < 0.001; n = 320

Table 8. Summary of the tested hypothesis

SN	Hypotheses	Decision
1	H1a: There is a significant positive relationship between neuroticism and students' level of creativity	Rejected
2	H1b: There is a significant positive relationship between extraversion and students' level of creativity	Accepted
3	H1c: There is a significant positive relationship between openness to experience and students' level of creativity	Accepted
4	H1d: There is a significant positive relationship between agreeableness and students' level of creativity	Accepted
5	H1e: there is a significant positive relationship between conscientiousness and students' level of creativity	Accepted
6	H2: Resources moderates the positive relationship between neuroticism and students' level of creativity	Accepted
7	H3: Skills moderates the relationship between openness to experience and students level of creativity	Accepted
8	H4: Environment moderates the relationship between extraversion and students' level of creativity	Accepted
9	H5: Intrinsic motivation moderates the relationship between agreeableness and students level of creativity	Accepted
10	H6: Knowledge moderates' conscientiousness and students level of creativity	Accepted

5. Discussion

According to Danaci (2015), creativity remains the cornerstone of architecture as it is the most captivating and stimulating aspect of the human mind. Two essential features of the architecture design process as pointed out by Mozaffar and Khakzand (2009): it is a creative effort and the design which has to do withdrawing. These features indicate that creativity is central to architecture. But differently, architecture by its nature is about creativity, not only in design but in all its forms, and therefore it is safe to assert that creativity and innovation are at the root of architectural design practices (ElMelegy et al., 2016). Heap defines creativity as the “ability to change old ideas to produce unique invention” (Heap, 1989). Creating something new requires a great deal of mental and imaginative ability which differs greatly from one individual to another (Götz & Götz, 1979). Some students are considered to be more creative than others. Consequently, this study seeks to investigate those determinants or predictors of individual students’ level of creativity among architectural students as well as the moderating effect of capacity variables in the relationship between personality and creativity.

One of the findings of this study revealed that four of the personality traits (neuroticism, extraversion, agreeableness, openness to experience, and conscientiousness) have a significant positive relationship with students’ level of creativity except for neuroticism which indicated a negative relationship with creativity. Neuroticism, one of the dimensions in the Big five personality traits measures the challenges or difficulties that one encounter while trying to cope with threats and stress. Such stress could affect the human mental state. Perhaps, that is the primary reason the relationship between neuroticism and students’ level of creativity turns out to be negative. This result, however, is consistent with some of the earlier studies such as Gotz and Gotz (1979) and Eysenck and Furnham (1993) respectively, which found a negative correlation between human creativity in sciences and neuroticism. However, when Arts is taken into consideration, the result is different as Gotz & Gotz (1979) found neuroticism to be positive with creativity in Arts. This study is not in support of Wolfradt and Pretz (2001) and Zare and Flinchbaugh (2019) which found a strong positive relationship between neuroticism and creativity. Thus, within the scope of this study, neuroticism does not have a significant positive relationship with creativity.

The result of this study also indicated that other personality traits such as extraversion, agreeableness, openness to experience, and conscientiousness, all had a positive significant relationship with students’ level of creativity. In describing the personality of a creative individual, Gelade (2002) pointed out that creative individuals are autonomous, energetic and independent, especially in judgment; they are not easily swelled by the crowd. All the four dimensions of personality trait, except Neuroticism according to this study, affect the individual level of creativity in varying degrees. The finding of this study is consistent with some previous studies and at the same time contradicts some others. For instance, studies such as Furnham and Nederstrom (2010) and Aguilar-Alonso (1996) found a positive relationship between

extraversion and creativity. On the other hand, Feist (1998) found a negative relationship between extraversion and creativity. This points to the fact that the relationship between the Big five personality traits and creativity is still not conclusive as different researchers keep coming up with different results given the effect of some extraneous variables.

This study is consistent with the study by Amabile et al. (1996) who also found a deep connection between intrinsic motivation and creativity. As well, Li et al., (2020) illustrated that intrinsic motivation strongly affects creativity. In the same vein, the result of this study is consistent with Puryear et al. (2019) who found a relationship between openness to experience and creativity; however, unlike this study, Puryear et al. (2019) rather found the differences in the strength of the various variables of personality and creativity. As revealed by Puryear et al. (2019) study, openness to experience was the most salient predictor of creativity among the personality factors. Perhaps, this is so because the constructs of openness to experience which include aesthetics, proclivity for imagination, deep thinking, and novel ideas, are all essential elements to trigger creativity. Like Puryear et al. (2019), other studies that tied openness to experience and creativity include (Jauk et al., 2013; Tan, 2019; Zare & Flinchbaugh, 2019).

Observing the results from several studies as indicated above, one could observe at one point or the other, each five personality traits in the Big Five personality model has either indicated a positive significant relationship with creativity, or negative, or even no significant relationship at all. Perhaps, this may be because every individual, regardless of which personality trait is dominant has some degree of creativeness (imaginativeness). This implies that what arouses creativity in an individual may not necessarily be the same with another individual. This may be one of the many reasons the study on the relationship between the variables in the Big Five personality traits and creativity is not yet conclusive notwithstanding the depth of study already carried out on the subject and the result keeps fluctuating between positive relationship, negative relationship, and insignificant or no relationship at all between personality and creativity. Consequently, more and more new studies on the topic seem inevitable. Given these mixed results, it becomes imperative to consider the possibility of introducing moderating variables in the relationship to determine the interaction effects of personality traits on creativity.

This led to the second objective of this study to determine the moderating effect of capacity variables on the relationship between the Big five personality traits and individual level of creativity. The hypothesis labeled H2 shows the moderating effect of Resources on the relationship between neuroticism and students' level of creativity. The result supports that resources have a moderating effect on the positive relationship between neuroticism and students' level of creativity. This implies that, although individuals with neuroticism personality may not necessarily be too creative, however, availability of resources may serve as a source of inspiration, thus resulting in a positive relationship between personality and creativity. This is not surprising since resources have been theorized by scholars, as being a necessity for creativity Sonenshein (2014) as it mitigates the chance of restriction Amabile et al. (1996) on what peoples could accomplish. According to Cyert and March (2005), lack resources foster creativity as it gives room for experimentations, innovation, needs to respond to uncertainty. Katila and Shane

(2005) also support that resources trigger creativity, especially, capital resources, when abundant, there is no fear of making mistakes (1981), and taking risks (Nohria & Gulati, 1996). Marion (2012) also supports that creativity functions best in a resource-rich environment. Thus, these theories justify the outcome of this study that resources moderate the relationship between personality and students' level of creativity. Thus, resources, whether abundant or limited, tend to foster creativity. When abundant, a creative individual tends to explore several alternatives; when scarce, a creative individual becomes even more innovative as an elevated sense of challenge motivates creativity (Ohly & Fritz, 2010).

Again, the present study revealed that skills moderate the relationship between openness to experience and students' level of creativity. Several studies have already indicated that openness to experience has a significant positive relationship with creativity. For instance, the study by Schretlen et al. (2010) shows that openness to experience has a positive association with creativity. Likewise, Kerr and McKay (2013) also found openness to experience as associated with all measures of creativity; however, these studies differ from the present study which introduces skills in the relationship. The result shows that skills influence the relationship between personality and creativity. The more skillful an individual is; the higher is his creativity. Skills accounts for individual's ability to present ideas orally to an audience; to discuss and argue a case, to willingly listen and being able to hear as well as actively comprehend verbal messages without undue blocking through; skills also accounts to individual's ability to use imagination and creativity fully to innovate, develop ideas or to carry out plans, ability to confront obstacles in pursuing an objective, etc, are without doubt enhance levels of creativity.

Another result of this study revealed that the environment moderates the relationship between extraversion and students' level of creativity. The environment is a complex term. In the field of an environmental psychologist, the environment involves both spiritual and material factors surrounding an individual. In this context, the environment includes the totality of human surroundings including family and friends, community, physical environment, etc. Amabile et al. (1988) gave prominent environmental factors as responsible for creativity, more than individual issues. Again, a study by Hennessey and Amabile (1988) also shows that social and environmental factors are essential in fostering creativity. Some of the creative factors identified in Hosseini's study as key to creativity include 1- Freedom 2- adequate resources, 3- time, 4- suitable atmosphere, 5- suitable research design and 6- pressure (Hosseini, 2009). Hamlin and Sawyer also indicated that the work environment affects creativity both in a group and on an individual basis (Hamlin and Sawyer, 2007). Therefore, one cannot overlook the moderating impact of the environment in the relationship between personality and creativity. Thus, one could conclude that environmental conditions have a significant impact on improving the levels of students' creativity. Some of the factors that emanate from environmental conditions include individual responsibility or job duties, relationship with other individuals, general attitudes of the people around, behavioral characteristics, conditions, situations, and circumstances. As pointed out by Ziegler and Kapur (2018), the development of creativity is based upon the circumstances and the situations that one is involved in; hence the environmental factors play an

important part in influencing the relationship between personality development and level of creativity.

The study also revealed that intrinsic motivation moderates the relationship between agreeableness and students' level of creativity. Motivation, as explained by Ziegler and Kapur (2018) is the key to creative production and the most important motivators, and according to Adams (2005), it is the inherent passion and interest in work. This is an example of intrinsic motivation. Thus, intrinsic motivation is another important variable for capacity according to the scope of this study. Amabile et al. (1996) identified intrinsic motivation as an important component that affects creativity. Again, Amabile and Mueller (2008) further pointed out that both intrinsic and extrinsic factors influence creativity. From the study, intrinsic factors include creativity-relevant processes, domain-relevant skills, and task motivation, that is, components within the individual. This indicates that, sometimes, factors within an individual motivates individual into becoming innovative and creative. Hamlin and Sawyer (2007) also acknowledge intrinsic as well as extrinsic factors as strong motivators of creativity. The outcome of this study is also consistent with Spender and Strong who pointed out that most creative and innovative ideas emanate from the people and not from "lab late at night" (Spender and Strong, 2010).

Finally, the study indicated that knowledge moderates the relationship between conscientiousness and students' level of creativity. Knowledge is all the understanding that an individual possesses and acquires through creative effort (Ziegler & Kapur, 2018). Knowledge goes beyond academic knowledge as it includes aspects such as knowledge about values, cultures, norms, standards, and principles that are essential in dealing with daily activities of life. Earlier studies on creativity have revealed that to improve creativity, multiple approaches are involved including continual education of the individuals on their capacity for generating new knowledge, discovering applications, and maintaining the knowledge for future applications (Chen & Chen, 2012; Laskin & Gardner, 1996). Thus, the high education individual acquired, both formal and informal education, the greater their creativity. Thus, Chen and Chen (2012) pointed out that higher education signifies the basic capacity of innovation, creativity, among others. It provides a premise for knowledge sharing which helps in enhancing individual creativity. Thus, the outcome of this study supports that knowledge is essential in the relationship between personality and creativity; and the higher individual knowledge, the more creative one becomes (Sohail and Daud, 2009). This result is consistent with Lee who also found knowledge, especially knowledge sharing as affecting individual creativity (Lee, 2018).

6. Conclusion

The present research used the concepts of creativity and the Big Five Personality traits to analyze the moderating impact of human capacities on the relationship between creativity and personality. As per the results, the four dimensions of personality traits as embodied in the Big Five Model, except for Neuroticism affect the individual level of creativity in varying degrees. However, previous studies have at various times shown that each five personality traits in the Big Five personality model have either indicated a positive significant relationship with creativity, or negative, or no significant relationship. The reason behind these variations could be that because

every individual, regardless of which personality trait is dominant have some degree of creativeness, thus implying that, what arouses creativity in an individual may not necessarily be the same with another individual. In addition, the results revealed that, to a large extent, capacity variables such as resources, skills, environmental conditions, intrinsic motivation, and knowledge moderate the relationship between personality and student's level of creativity.

References

1. Adams, K. (2005). The Sources of Innovation and Creativity. National Center on Education and the Economy (NJ1).
2. Aguilar-Alonso, A. (1996). Personality and creativity. *Personality and individual differences*, 21(6), 959-969.
3. Amabile, T. M., & Gryskiewicz, N. D. (1989). The creative environment scales: Work environment inventory. *Creativity research journal*, 2(4), 231-253.
4. Amabile, T. M., & Mueller, J. (2008). Assessing creativity and its antecedents: An exploration of the componential theory of creativity.
5. Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of management journal*, 39(5), 1154-1184.
6. Amabile, T.M. (1988). A model of creativity and innovation in organizations. In: B.M. Staw & L.L. Cummings (Eds.), *Research in Organizational Behavior* (pp. 123167). Greenwich: CT: JAI Press
7. Barron, F., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual review of psychology*, 32(1), 439-476.
8. Bebbington, A., Dharmawan, L., Fahmi, E., & Guggenheim, S. (2006). Local capacity, village governance, and the political economy of rural development in Indonesia. *World Development*, 34(11), 1958-1976.

9. Bourgeois III, L. J. (1981). On the measurement of organizational slack. *Academy of Management review*, 6(1), 29-39.
10. Boyce, C., Czajkowski, M., & Hanley, N. (2019). Personality and economic choices. *Journal of Environmental Economics and Management*, 94, 82-100.
11. Bridges, D., & Schendan, H. E. (2019). Sensitive individuals are more creative. *Personality and Individual Differences*, 142, 186-195.
12. Castillo-Vergara, M., Galleguillos, N. B., Cuello, L. J., Alvarez-Marin, A., & Acuña-Opazo, C. (2018). Does socioeconomic status influence student creativity? *Thinking Skills and Creativity*, 29, 142-152. DOI:10.1016/j.tsc.2018.07.005
13. Chan, S., & Yuen, M. (2014). Creativity beliefs, creative personality and creativity-fostering practices of gifted education teachers and regular class teachers in Hong Kong. *Thinking Skills and Creativity*, 14, 109-118.
14. Chen, J. K., & Chen, I. S. (2012). Critical creativity criteria for students in higher education: Taking the interrelationship effect among dimensions into account. *Quality & Quantity*, 46(4), 1057-1075.
15. Costa, P. T., & MacCrae, R. R. (1992). Revised NEO personality inventory (NEO PI-R) and NEO five-factor inventory (NEO-FFI): Professional manual. Psychological Assessment Resources, Incorporated.
16. Cyert, R., & March, J. (1963). *A Behavioural Theory of the Firm* (Malden, MA: Blackwell Business).
17. Danaci, H. M. (2015). Creativity and knowledge in architectural education. *Procedia-Social and Behavioral Sciences*, 174, 1309-1312.
18. De Lucia, C., Balena, P., Melone, M. R. S., & Borri, D. (2016). Policy, entrepreneurship, creativity and sustainability: the case of 'principi attivi' ('Active ingredients') in apulia region (southern Italy). *Journal of cleaner production*, 135, 1461-1473.
19. ElMelegy, A. R., Mohiuddin, Q., Boronico, J., & Maasher, A. A. (2016). Fostering creativity in creative environments: An empirical study of Saudi Architectural Firms. *Contemporary Management Research*, 12(1).

20. Eysenck, H. J., & Furnham, A. (1993). Personality and the Barron-Welsh art scale. *Perceptual and motor skills*, 76(3), 837-838.
21. Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and social psychology review*, 2(4), 290-309.
22. Field, A. (2009). *Discovering Statistics using SPSS*. Sage: London.
23. Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications*.
24. Furnham, A., & Nederstrom, M. (2010). Ability, demographic and personality predictors of creativity. *Personality and individual differences*, 48(8), 957-961.
25. Galton, F. (1883). *Inquiries into human faculties and its development*. London: Macmillan.
26. Gelade, G. A. (2002). Creative style, personality, and artistic endeavor. *Genetic, Social, and General Psychology Monographs*, 128(3), 213.
27. Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The qualitative report*, 8(4), 597-606.
28. Götz, K. O., & Götz, K. (1979). Personality characteristics of successful artists. *Perceptual and Motor Skills*, 49(3), 919-924.
29. Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of personality and social psychology*, 85(2), 348.
30. Guilford, J. P. (1950). *Creativity: American Psychologist*. Citado en *Dinámicas entre creación y procesos terapéuticos* (2006)(coord. Coll). Murcia: Valle de Ricote. Universidad de Murcia.
31. Hamlin, R. G., & Sawyer, J. (2007). Developing effective leadership behaviours: The value of evidence-based management. *Business Leadership Review*, 4(4), 1-16
32. Harris, R. (1998). *Introduction to creative thinking*. Retrieved January 31, 2010.
33. Hazrati-Viari, A., Rad, A. T., & Torabi, S. S. (2012). The effect of personality traits on academic performance: The mediating role of academic motivation. *Procedia-Social and Behavioral Sciences*, 32, 367-371.

34. Heap, J. (1989). The management of innovation and design. Cassell.
35. Hosseini, A. A. (2009). The nature of creativity and its development methods.
36. Irouke, V. M. & Ahianba, J. E. (2013) Advancement of creativity in architectural design education. A.A.U. Journal of Environmental Studies, 1 (1), 78 -82.
37. Jauk, E., Benedek, M., Dunst, B., & Neubauer, A. C. (2013). The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection. *Intelligence*, 41(4), 212-221.
38. John, O. P., Robinson, R. W., & Pervin, L. A. (2011). *Handbook of personality: Theory and research*. New York: Guilford
39. Johnson, C., & Bowler, N. (2009). On the reliability and calibration of ensemble forecasts. *Monthly Weather Review*, 137(5), 1717-1720.
40. Katila, R., & Shane, S. 2005. When does lack of resources make new firms innovative? *Academy of Management Journal*, 48: 814-829.
41. Kerr, B., & McKay, R. (2013). Searching for tomorrow's innovators: Profiling creative adolescents. *Creativity Research Journal*, 25(1), 21-32.
42. Kreitler, S. (2019). Towards a consensual model in personality psychology. *Personality and Individual Differences*, 147, 156-165.
43. Krishnaveni, R., & Sujatha, R. (2013). Institutional Capacity Building: A Systematic Approach. *SCMS Journal of Indian Management*, 10(4).
44. Laskin, E., & Gardner, H. E. (1996). *Leading Minds: An Anatomy of Leadership*.
45. Lee, J. (2018). The Effects of Knowledge Sharing on Individual Creativity in Higher Education Institutions: Socio-Technical View. *Adm. Sci.* 8, 21; 1-16. doi:10.3390/admsci8020021
46. Li, W., Bhutto, T. A., Xuhui, W., Maitlo, Q., Zafar, A. U., & Bhutto, N. A. (2020). Unlocking employees' green creativity: The effects of green transformational leadership, green intrinsic, and extrinsic motivation. *Journal of Cleaner Production*, 255, 120229.

47. Marion, R. (2012). Leadership of creativity: Entity-based, relational, and complexity perspectives. In *Handbook of organizational creativity* (pp. 457-479). Academic Press.
48. McCord, J. L., Harman, J. L., & Purl, J. (2019). Game-like personality testing: An emerging mode of personality assessment. *Personality and Individual Differences*, 143, 95-102.
49. Michalos, A. C. (Ed.). (2014). *Encyclopedia of quality of life and well-being research*. Dordrecht: Springer Netherlands.
50. Mishra, M., Garg, K., & Nagpal, T. (2016). Relationship between creativity traits and academic performance of management students. *Man In India*” retrieved from https://www.researchgate.net/publication/304943263_Relationship_between_creativity_traits_and_academic_performance_of_management_students, on February 12th 2018.
51. Mishra, P., & Henriksen, D. (2018). *Creativity, technology & education: exploring their convergence*. Springer.
52. Morgan, P. (2006). The concept of capacity. *European Centre for Development Policy Management*, 1-19.
53. Mozaffar, F., & Khakzand, M. (2009). Architectural design process in technology age. *International Journal of Industrial Engineering & Production Management*, 19(6), 53-72.
54. Mullet, D. R., Willerson, A., Lamb, K. N., & Kettler, T. (2016). Examining teacher perceptions of creativity: A systematic review of the literature. *Thinking Skills and Creativity*, 21, 9-30.
55. Nohria, N., & Gulati, R. (1996). Is slack good or bad for innovation?. *Academy of management Journal*, 39(5), 1245-1264.
56. Ohly, S., & Fritz, C. (2010). Work characteristics, challenge appraisal, creativity, and proactive behavior: A multi-level study. *Journal of Organizational Behavior*, 31(4), 543-565.

57. Okpara, F. O. (2007). The value of creativity and innovation in entrepreneurship. *Journal of Asia Entrepreneurship and sustainability*, 3(2), 1.
58. Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological bulletin*, 135(2), 322.
59. Puryear, J. S., Kettler, T., & Rinn, A. N. (2019). Relating personality and creativity: Considering what and how we measure. *The Journal of Creative Behavior*, 53(2), 232-245.
60. Rahimi, H., Arbabisarjou, A., Allameh, S. M., & Aghababaei, R. (2011). Relationship between knowledge management process and creativity among faculty members in the university. *Interdisciplinary Journal of Information, Knowledge, and Management*, 6, 17-33.
61. Raza, S. A., & Shah, N. (2017). Influence of the Big Five personality traits on academic motivation among higher education students: Evidence from developing nation.
62. Rosa-Mendes, M., Pires, R., & Ferreira, A. S. (2019). Personality traits of the alternative DSM-5 model and the attachment dimensions in Portuguese adults. *Personality and Individual Differences*, 143, 21-29.
63. ROSELLO, J., & TRAN, V. (2011). Assessing the climate for creativity: the example of a french high-tech organization. *THE ULTIMATE EXPERIENCE IN COLLABORATION*, 626.
64. Schretlen, D. J., van der Hulst, E. J., Pearlson, G. D., & Gordon, B. (2010). A neuropsychological study of personality: Trait openness in relation to intelligence, fluency, and executive functioning. *Journal of clinical and experimental neuropsychology*, 32(10), 1068-1073.
65. Smith, L. (2010). Brisbane: Mindfulness: Self-Compassion: Lyndi Smith. Retrieved from <http://lyndismith.wordpress.com/>
66. Sohail, M. S., & Daud, S. (2009). Knowledge sharing in higher education institutions. *Vine*.

67. Sonenshein, S. (2014). How Organizations Foster the Creative Use of Resources. *Academy of Management Journal*. 2014, Vol. 57, No. 3, 814-848. <http://dx.doi.org/10.5465/amj.2012.0048>
68. Spender, J. C., & Strong, B. (2010). Who Has Innovative Ideas? Employees. *The Wall Street Journal*.
69. Tan, C. S., Lau, X. S., Kung, Y. T., & Kailsan, R. A. L. (2019). Openness to experience enhances creativity: The mediating role of intrinsic motivation and the creative process engagement. *The Journal of Creative Behavior*, 53(1), 109-119.
70. Thomas, G. G. (2011). Employee Motivation and Job Satisfaction in Project-based Organization: The case of the UAE (Doctoral dissertation, The British University in Dubai).
71. Wang, M. Z., Chen, W., Zhang, C., & Deng, X. L. (2017). Personality types and scholarly creativity in undergraduate students: The mediating roles of creative styles. *Personality and Individual Differences*, 105, 170-174.
72. Wolfradt, U., & Pretz, J. E. (2001). Individual differences in creativity: Personality, story writing, and hobbies. *European journal of personality*, 15(4), 297-310.
73. Zare, M., & Flinchbaugh, C. (2019). Voice, creativity, and big five personality traits: A meta-analysis. *Human Performance*, 32(1), 30-51.
74. Ziegler, E., & Kapur, M. (2018). The interplay of creativity, failure and learning in generating algebra problems. *Thinking Skills and Creativity*, 30, 64-75.
75. Zinke, J. (2006). Monitoring and evaluation of capacity and capacity development. European Centre for Development Policy Management: Maastricht, The Netherlands.